ART. VII.—A NEW FUNCTION OF THE CORPORA QUADRIGEMINA.

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THAT the secretion of sweat is under the domination of nerve centres seated in the spinal cord and medulla oblongata has been proved by Luchsinger, Nawrocki, Vulpian* and others. One of us, with Woroschiloff's instrument, has proven that in the cat the sweat fibres run in the lateral columns of the spinal cord; that the cells of the sweat glands exhibit microscopical changes corresponding to the activity of the secretory process, the cells in activity being smaller than the cells at rest, more granular as regards their protoplasmic contents, and more highly tinged by carmine; that there is a peripheral inhibitory apparatus of the sweat secretion, for when pilocarpin is administered irritation of the sciatic checks the secretion, as well as local irritation applied to the ball of the foot; that probably the multipolar ganglion cells, described by Coyne, on the sweat glands, are a part of the secreto-inhibitory apparatus; that after section of the sciatic the secretory nerves live longer than the motor; that after death of the secretory nerves muscarin is still able to call the sweat glands into activity, which pilocarpin is not able to do. Vulpian† has already located an apparatus inhibiting sweat in the medulla oblongata; but irritation of this part by electrical currents always brings out a profuse secretion of sweat, and sensory irritation is not able to arrest it. Our aim has been to discover the seat of the inhibition of sweat, for several pathological cases seemed to point to the existence of such a mechanism.

Method :—Young cats were selected as the most suitable for these experiments, as they sweat very readily. Then, after the method described by Nothnagel, a concentrated solution of chromic acid was injected by means of a hypodermic syringe into various parts of the brain. In young animals the needle penetrates the skull without the need of a trephine. The sweat secretion was noted before the operation and for some hours or days after the injection. When injections were made into the upper part of the medulla oblongata no inhibition of sweat was observed, neither when the lesion involved the pons varolii or the cerebellum. But when the corpora quadrigemina were affected by it then the feet became very dry and remained so for some days. The seat of lesion by the acid was discovered by removing the skull with a bone forceps, hardening the brain in alcohol, and then removing portions of it till the discolored broken down spot in the brain was discovered. The following experiment, being but one of many, demonstrates the secreto-inhibitory centre: Ex. 1.—Cat, etherized; injection of a few drops of a solution of chromic acid into the corpora quadrigemina (as proved on autopsy). After the animal recovered from the shock, the feet were examined and found to be quite dry, being very moist previous to the injection. This dryness of feet continued for some days.

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† *Comptes Rendus*, tome LXXXVI., p. 1276.

That the arrest of secretion is not due to vaso-motor changes is proved by the fact of this centre not being located near the point of irritation by the acid. Further, one of us has proven by experiments, that circulatory changes have hardly any effect at all upon the sweat-secretion. That the sweat glands are still able to secrete is proven by the production of asphyxia, the carbonic anhydride here acting as an excitant. This method of experimentation excludes any errors which may be due to spread of current when electricity is used. That electric irritation will also arrest the secretion of sweat was proved by the following experiment:

Ex. 2.—Kitten; received subcutaneously about a cubic centimetre of fluid extract of jaborandi—two holes were trephined into the skull. When the animal was sweating profusely from the drug, needle electrodes insulated to near their points were sunk into the brain so as to irritate the corpora quadrigemina. A very feeble current was used, derived from a DuBois induction apparatus. The sweating was arrested, and this arrest continued for some time after the irritation was removed.

The fact of an inhibitory apparatus located in the tubercular quadrigemina explains how we have a hot yet a non-sweating skin. Heat is normally a great excitant of the sweat centres, but in fever the poison irritates the inhibitory apparatus of the secretion of sweat. Fright not only paralyzes the cardio-inhibitory apparatus, but also the suduro-inhibitory apparatus, whereby the spinal sweat centres come into full play. Feeble persons, whose inhibitory mechanisms are always weak, perspire easily for similar reasons.

Schuh also relates two cases where after section of the frontal nerve, sweating was continuous on that side of the brow ever afterwards.

Further proof with the experiments in detail will be presented by one of us (Mr. Field) in his thesis.